ADDITIONAL OBSERVATIONS ON PLUMATELLA REPENS(L.) (A FRESH-WATER BRYOZOAN) III. VARIATION OF THE FLOATOBLASTS AT LOW TEMPERATURE

BULLETIN OF THE MARINE BIOLOGICAL STATION OF ASAMUSHI,
VOL. XIV, NO. 1. 1970

ADDITIONAL OBSERVATIONS ON *PLUMATELLA REPENS*(L.) (A FRESH-WATER BRYOZOAN) III. VARIATION OF THE FLOATOBLASTS AT LOW TEMPERATURE[1)]

By

MAKOTO TORIUMI

鳥 海 衷

Marine Biological Station, Tôhoku University
Asamushi, Aomori City

INTRODUCTION

Some circular floatoblasts, which beared close resemblance to those of *Hyalinella orbisperma* (KELLICOT) reported by Bushnell in 1965, were found among the floatoblasts of the Plumatellas obtained from the Maya-ike in Kakogawa City, Hyôgo Prefecture on March 27, 1959. Abundant nearly circular floatoblasts were also collected from the reservoir Aomori No. 3, and from Tsuta-numa.

Although the floatoblasts differ from those of *Plumatella repens* in shape, the major structure coincides with that of *P. repens*. From this fact, it seems that the circular and the nearly circular floatoblats have relation with those of *P. repens*.

The writer attempted to clarify this relation by observations on some rearing experiments, and the results obtained are given in this paper.

Before proceeding further, the writer would like to express his hearty thanks to Drs. Yoshiko Kakinuma, Zen-ichiro Hoshino and Takaharu Numakunai of the Marine Biological Station, Tôhoku University for their assistance in collecting the materials.

VARIATION OF THE FLOATOBLASTS IN THE TSUTA-NUMA MATERIALS

The circular and the nearly circular floatoblasts of the specimens from three places were collected together with the normal floatoblasts of *P. repens* (Fig. 1, A,B) And, moreover, the major structure of the circular floatoblasts were found coincided with that of *P. repens* as mentioned above. These facts suggested that they have a certain relation with *P. repens*. The observations made on the field materials from Tsuta-numa are as follows.

1) Contributions from the Marine Biological Station, Tôhoku University, Aomori City, No. 382

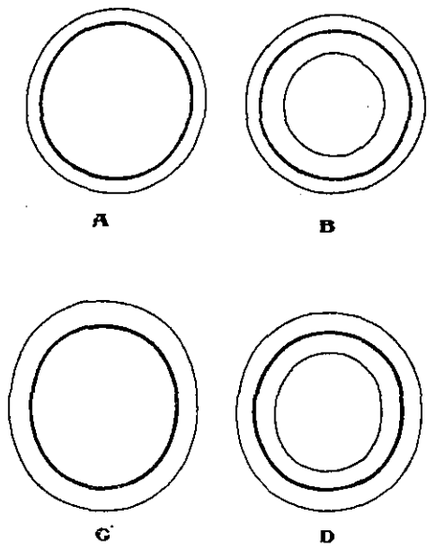

Fig. 1 The circulr and the nearly circular floatoblasts ×80
A-Maya-ike, ventral side B-ditto, dorsal side March 27, 1959 C-Tsuta-numa, ventral side D-ditto, dorsal side The nearly circular floatoblasts of C and D were produced from the colony reared at 13°C. April 14, 1969

(a) The materials are six in number. They were collected during the summers of 1936 to 1951. No circular floatoblasts were seen in the colonies of these materials.

(b) On September 11, 1968, the floatoblasts floating on the surface of Tsuta-numa and some short branches of the colonies of *P. repens* on submerged twigs were collected. The majority of the polypides had degenerated in the colonies. A few circular floatoblasts were seen among the floating floatoblasts. The floatoblats in the branches, although they few in number, were nearly circular.

(c) The circular one among the floating floatoblasts was continuous to the normal floatoblast of *P. repens* by transitional forms.

(d) The water temperature when the collection was made at noon on September 11th was 12.8°C.

From these facts, it seemed that the circular floatoblast was formed at low temperature. On this account, a rearing observation was made using the material collected on September 11th.

Observation 1

Method. (a) The sessoblasts were put in a dish with the pond water at 25°C. They germinated on October 19th. The newly formed young colonies, which had

two or three polypides, were reared in respective dishes at 25°C. The water was renewed once a day with the pond water as in the previous observations on *P. repens*. On December 4, 1968, the floatoblasts were examined.

(b) One branch of a colony that germinated on February 2, 1969 from the sessoblast, was transferred to a new dish and reared at 20°C. The newly formed floatoblasts were examined on March 3rd. Another branch of the same colony was reared at 13°C from February 17th to March 13th. This material was put at room temperature (about 25°C) for 10–20 minutes when the water was renewed and the dish cleaned every day.

(c) The remaining colony was reared at 13°C from March 13th to April 14th. This material was put at room temperature for 1–3 minutes when the water was renewed every day. The dish containing this material was not cleaned.

Result. The floatoblasts varied in a wide range in measurements influenced by water temperature. The floatoblasts were from 0.34 mm to 0.42 mm in length and from 0.28 mm to 0.34 mm in width. The ratio of length to width was 1.07–1.44. The floatoblasts decrease in length but increase in width at low temperature, and thus, the shape becomes nearly circular (Fig. 1, C, D, Table I).

Table I

Date examined	Length (mm)		Width (mm)		Ratio (L/W)		Number of readings
	Mean	Range of variation	Mean	Range of variation	Mean	Range of variation	
XII 4th, 1968	0.401	0.37-0.42	0.295	0.28-0.31	1.35	1.25-1.44	35
III 3rd, 1969	0.395		0.305		1.29		18
IV 14th, 1969	0.375	0.34-0.41	0.317	0.29-0.34	1.18	1.07-1.31	64

Observation 2

Material. The floatoblasts produced from the colonies in the first and the second generations

Method. (a) The young colonies were divided into two groups and reared at 25°C and 13°C from June 2, 1969. The newly formed floatoblasts were examined on July 6th and 15th.

(b) The young colonies germinated on July 29th were divided into three groups and reared at 28°C, 23°C and 13°–15°C respectively from August 18, 1969. The cleaning of dishes was made at room temperature of 25°–27°C for 10–20 minutes every day. The floatoblasts were examined on September 15th.

Result. The result is similar to that of Observation 1. At low temperature the floatoblasts decrease in length and increase in width, and become less elongated (Tables II, III, Fig. 2, A, B).

Table II

Date examined	Length (mm)		Width (mm)		Ratio (L/W)		Number of readings
	Mean	Range of variation	Mean	Range of variation	Mean	Range of variation	
VII 6th, 1969	0.405	0.38-0.43	0.297	0.28-0.31	1.36	1.28-1.47	63
VII 15th, '69	0.389	0.35-0.43	0.315	0.28-0.36	1.23	1.09-1.31	128

Table III

Temperature	Length (mean)	Width (mean)	Ratio (L/W)	Number of readings
28° C	0.392*	0.282	1.39	23
23° C	0.399	0.290	1.37	68
13°-15° C	0.390	0.310	1.25	93

* This length is too short in comparison with those at 28°C. On September 3rd. 1969, the mean length at 28°C was 0.404 mm (number of readings 57).

VARIATION OF THE FLOATOBLAST IN THE OTHER MATERIALS

In the previous report, the writer stated that many intraspecific groups were seen in *P. repens*. The difference among the groups should be observed in this variation. The groups were compared with the Tsuta-numa material in Observation 3.

Observation 3

Materials. (a) Aomori No. 3 C
(b) Morigô SF

Method. The rearing method is similar to that in Observation 2. The newly formed floatoblasts were compared with those of the Tsuta-numa material on September 15, 1969.

Result. The tendency of decreasing the length at low temperature is similar to one another as shown in Table IV. Under the same condition, the floatoblasts of the Morigô SF became most rounded (Fig. 2, Table IV).

Thus, it may be concluded that the floatoblasts vary in a wide range in measurement influenced by water temperature, and that they decrease in length and increase in width at low temperature.

CONSIDERATION ON THE CIRCULAR FLOATOBLAST

In general, the water of the reservoirs used for the rice field dry up or decrease markedly in summer and the colonies disappear at the beginning of

Table IV

Material	Temperature	Length (mean)	Width (mean)	Ratio (L/W)	Number of readings
Morigô SF	28° C	0.359	0.269	1.33	52
	23°	0.350	0.269	1.29	46
	13°	0.338	0.278	1.21	31
Aomori No. 3 C	28°	0.374	0.271	1.37	40
	23°	0.363	0.277	1.30	78
	13°	0.349	0.284	1.22	40

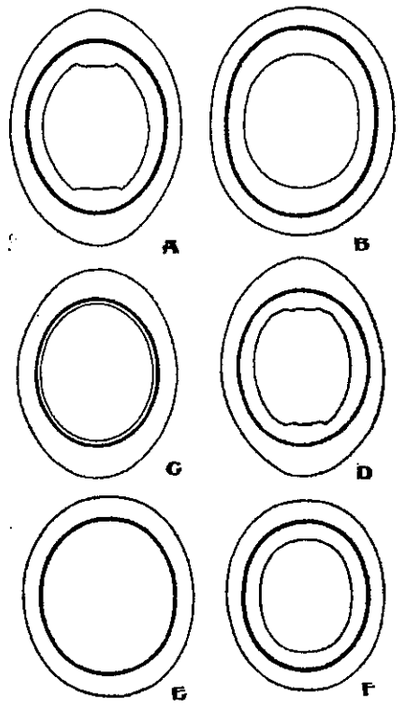

Fig. 2 The floatoblasts of the reared colonies ×80 September 15, 1969
A-Tsuta-numa, dorsal side 28°C B-ditto, dorsal side 13°C C-Morigô SF, ventral side 28°C
D-ditto, dorsal side 28°C E-ditto, ventral side 13°C F-ditto, dorsal side 13°C

autumn. In Maya-ike and Tsuta-numa, the water level is almost constant throughout the year and the water in the reservoir Aomori No. 3 decrease in summer but increase at the beginning of autumn. From this fact, it seems that the colonies of *P. repens* can live during a long period from spring to the end of autumn, and the circular floatoblasts are produced at low temperature at these places.

In Observation 3, the shape of the floatoblasts showed difference among the intraspecific groups at the same degree of water temperature. This fact

shows that the circular floatoblasts are produced easily in some intraspecific groups. It may be said that the causes by which the circular floatoblasts are few in number may be the difference of the intraspecific groups in the formation of the circular floatoblast, and the condition of the water.

CIRCULAR FLOATOBLASTS IN THE OTHER SPECIES

The circular floatoblasts closely resemble those of *Hyalinella orbisperma* in shape, but it seems that the colony of this species differs from that of *P. repens*. Besides *H. orbisperma*, the colony of *Stephanella hina* OKA produces circular floatoblasts. In this species, however, the float of the statoblast is wider than that of *P. repens* and *H. orbisperma* as shown in Fig. 3 A. No tuberculation on the capsule is seen in *S. hina*. Between this species and *P. repens*, many marked differences are seen in the features, and it cannot be said that the resemblance of the circular floatoblast indicates their close phylogenetic relationship. It is certain that the resemblance of one feature does not always show the phylogenetic relationship among the species. The colonies of *S. hina* grow in winter in general, and they also produce the nearly circular floatoblasts in late spring although they are few in number. It should be considered that the resemblance of the shape is caused by the similarity of the environmental conditions.

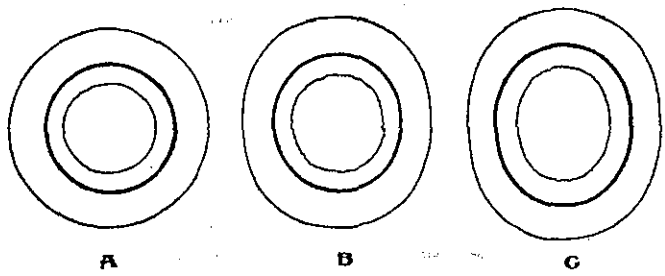

Fig. 3 The floatoblasts in one colony of *Stephenella hina* OKA collected on June 21, 1951 Isedô No. 4 in Sendai. In general, the colonies of this species are seen from December to March in Sendai. They produce the circular floatoblasts. In the material collected on June 21st, the majority of the floatoblasts were nearly circular. ×80

SUMMARY

1. The floatoblast of *P. repens* varies in a wide range in measurements influenced by water temperature.

2. The floatoblast decreases in length and increases in width at low temperature and thus it becomes circular.

3. The circular floatoblasts are produced by some intraspecific groups at low temperature.

4. It is very difficult to interpret the phylogenetic relationship between *P. repens* and *S. hina* only by the resemblance of the shape of the circular floatoblast.